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IIW Commission V
Quality Control and Quality Asurance of Welded Products, Annual Report 1995/96

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NATIONAL INSTITUTE OF STANDARDS AND TECHNOLOGY, Arati Prabhakar, Director

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IIW Commission V

Quality Control and Quality Assurance of Welded Products

Annual Report 1995/96

Thomas A. Siewert

National Institute of Standards and Technology
Boulder, Colorado

The Annual Report 1995/96 for Commission V, Quality Control and Quality Assurance of Welded Products, of the International Institute of Welding includes (a) minutes, resolutions, and the future program adopted at its Annual Assembly in June 1995, (b) the organization, officials, and delegates, (c) schedules of meetings, and (d) the status of documents published by Commission V. It reviews current research and work on standardization.

Key words: eddy-current inspection; nondestructive evaluation; quality assurance; ultrasonic inspection; welding; x-ray inspection

1. Introduction

Commission V, Quality Control and Quality Assurance of Welded Products, of the International Institute of Welding (IIW) meets annually to review the past year's accomplishments and to discuss future activities. In June 1995, the Annual Assembly met in Stockholm, Sweden. The minutes of the Annual Assembly 1995 included in this report are based on notes taken during the meeting and on IIW documents V-1055-95, V-1057-95, and V-1058-95 (Annual Assembly daily minutes).

The organization, officials, and delegates of Commission V are outlined in Appendix A, along with the subcommittee and working group meetings held during the past year. Although substantial progress occurred in the past year, as evidenced by the documents listed in Appendix B, we can improve our productivity by encouraging more professionals to contribute to the work of Commission V.

Currently, Commission V is concentrating on the following areas:

- Validation of nondestructive testing (NDT) techniques
- NDT to assess fitness for purpose
- NDT acceptance criteria for weld-quality classes
- Quality assurance in welding technology
- Radioscopic systems (including preparation of ISO standard proposals)
- Radiographic imaging
- Classification of radiographic film systems (including preparation of ISO standard proposals)

- Ultrasonic imaging and automated ultrasonic testing
- Revision of the manual for ultrasonic examination of ferritic welds
- Investigation of low-frequency eddy current apparatus for examining the surface of ferritic welds and austenitic material and the structure of Al welds
- The use of liquid penetrants to inspect welds
- Inspection of offshore welded construction
- Review of the requirements of ISO 5817
- Digitization of radiographic film

Commission V delegates are listed in Appendix A.

2. Minutes of the Annual Assembly 1995

For the International Institute of Welding, Commission V focuses on weld inspection and quality control. This report summarizes the information presented at the Annual Assembly 1995, which includes descriptions of both research and draft ISO standards being developed from the research data. The information comes from the various multinational subcommissions, working groups, and task groups within Commission V. Thus, this summary provides an up-to-date review of research activities in the countries represented and advance notice of standardization activities.

Commission V includes subcommissions that concentrate on quality assurance in welding technology and on the principal techniques for nondestructive inspection (x-ray, ultrasonic, electrical, magnetic, and optical) as well as a working group whose task is inspection of offshore construction. This year, Commission V met 14 through 16 June in Stockholm, Sweden. Twenty-two delegates and experts from twelve countries attended the meetings. Following are edited reports of the subcommissions and working groups, in order of their presentation.

2.1 Subcommission VA – Radiography-Based Weld Inspection Topics

The Subcommission Chairman, Heinrich Heidt, began with a short summary of the status of his projects and gave his report (IIW Document V-1047-95) of the VA intermediate meeting in Fort Lauderdale, Florida, which was held in conjunction with the meetings of ASTM Committee E07. This joint meeting proved useful in that each side learned more about the activities of the other. The long-term goal is that the two organizations would develop standards that are more compatible, and it is hoped identical.

There have been several presentations at previous intermediate meetings on radiograph digitizing equipment and the need to evaluate the capabilities of these media by quantitative measures. The Commission recognized this interest and at the 1994 Annual Assembly added the topic of radiograph digitization to the work list for the subcommission. At the 1995 intermediate meeting, Ben Nightingale of E07 described the ASTM activities in radiograph digitization and may serve as liaison between the two groups. The activity will be the subject of a new task group, proposed to include: Ben Nightingale (GE-USA), Hannelore Wessel (BAM-Berlin), Dr. Mattis (Siemens-Erlangen), Mr. Oellrich (Preussen Elektra-Hannover), a representative from AGFA-Belgium, and a representative from Kodak. Anyone else interested in participating should contact the Chairman, Dr. Heidt.

Interest in developing a classification for film systems continues. Dr. Heidt reported on the recent effort in ISO and EN on this topic. ISO draft Standard 11699-1 and EN Standard 584-1 were developed in cooperation of the members of this subcommission. They are similar in content and meet the needs of weld radiography. ISO TC 42 (Photography) is revising ISO Standard 7004, which will be similar to these two standards, but contain more details on the measurement procedures. I will encourage a close integration between ASTM activities and the SC VA working party. The working party will also stay in close communication with ISO Committee TC 42.

The working party on radioscopy systems for weld inspection has a new convener, Mr. Purschke, a long-time member of the working party. In the last year, the working party has held joint meetings with the corresponding groups in CEN TC 138 WG 1 (Radiography) and with interested experts of ISO TC 135 SC V. These joint meetings are resulting in the wide distribution and discussion of the standards being developed by the IIW and should promote international standardization. A major topic of discussion is the proper setup of radioscopy systems for specific applications. A round robin

is underway to determine the characteristic parameters. I encourage participation by the ASTM E07.01 members, so that they help shape the draft document (and reduce the chance of a negative vote during subsequent ISO balloting). The round robin should indicate whether a general classification system is feasible.

The subcommittee continues to work on a revision to ISO Standard 5579 (NDT: Radiographic Examination of Metallic Materials by X- and Gamma Rays). They are incorporating the changes suggested at the 1993 ISO TC 135 and the 1994 ISO TC 135 SC 5 meetings. The result will be a draft that combines the original IIW structure with some of the parameter definitions of EN 444.

The subcommission continues to search for a resolution to the problems with the use of radiography under ISO Standard 5817, which is based on fitness-for-purpose principles. The two approaches proposed are: to have a quantitative description of indications (by length, width, area, etc.) or qualitative definition by comparable radiographs which define a corresponding quality level. The subcommission favors the qualitative approach and is developing a reference radiograph (film) catalog. They have defined its characteristics, characteristics which cannot be met by the present IIW radiograph collections. (However, the commission recommends that the present radiograph collections continue to be made available to support existing applications.) The German Welding Society (DVS) has a 67-radiograph collection that closely matches the new requirements and has offered it to the Commission. Karl Fischer of DVS gave us a presentation on the details of the catalog, described its application, and answered questions. At its last meeting, subcommission VA decided that the DVS collection would be suitable with a few conditions: addition of radiographic parameters for each radiograph, use of ISO terminology exclusively, being open to future additions, and development of statistical correlations to ISO 5817 (by probability of detection or receiver operator characteristics). These changes have already been made and the Commission unanimously approved the following resolution: "Commission V recommends that the DVS reference radiograph set be adopted as the newest IIW reference radiograph set for use with ISO Standard 5817. The older sets (both radiographs and a printed booklet, as listed in the IIW catalog) shall continue to be offered for sale. The new set will be titled "Reference Radiographs for Assessment of Weld Imperfections according to ISO 5817" and should also be identified as IIW Doc. V-1056-95 (a Class B Document)."

Dr. Heidt described the availability of selenium 75 as a gamma-ray source and provided some curves showing its benefits over other isotopes. He expects to offer a written report at the next intermediate meeting.

In addition to the active work items, new activities include:

-radiograph digitization,
-additional guidelines on the use of ISO Standard 5817,
-discussions about validation, statistical methods, and acceptance criteria.

2.2 Subcommission VB – Quality Assurance

The Chairman, Peter Kunzmann, gave a summary of the intermediate meeting held in Basle on March 17th (IIW Doc V-1048-95). The working program was updated and restated as: formulating a concept for quality management in welding (to clarify the relationship between existing standards and investigate the need for new standards), formulating a guideline for quality management in welding (to help users select a quality management system adequate for their organization), and collecting

information on computer-aided quality control, on-line weld monitoring, fitness for purpose, and acceptance criteria in welding (to define the need for further support in applying these tools).

We discussed the application of ISO Standard 5817 to welded structures. Dr. Kunzmann described the different aspects of the problem: the customer defines his requirements, the designer looks at mechanical properties, and the manufacturer lists the imperfection acceptance criteria. In addition, fitness-for-purpose specialists link imperfections to mechanical properties, and inspectors link the inspection process signals to the location and number of imperfections. The acceptance criteria are important in that they form the basis by which the inspectors (by various techniques) determine the suitability of the part. We had a lively discussion about alternate views and definitions of these roles and how they should be related. ISO TC 44 SC10 is also investigating what changes should be made to ISO Standard 5817 to make it more useful. We will have a report on their activities over the next several years.

On the concept of quality management, Dr. Kunzmann reported how both EN and ISO have developed large families of standards for controlling quality (that cover most of the various aspects in controlling quality). These various quality standards are being grouped according to the 20 quality items in ISO Standards 9000 and 3834. The result should be a much more logical system for all the quality-related standards. An update on this reorganization will be given at the next meeting. However, comparison of this list to a list of the steps in the construction and validation of a structure seems to indicate that a few topics may not be covered. We discussed how we might confirm that these gaps exist and learn how we might fill them. He will circulate the most recent list of the standards (and potential missing areas) to the SC VB members, and prepare an updated report for the next meeting. One suggestion was to contact the Force Institutes to see what has been done in this area.

On quality management guidelines, he indicated that the rapid growth in quality standards has made our guideline (IIW-902-88) obsolete and we should consider updating it. A very useful addition to the new guide would appear to be an expert system, which would collect the relevant conditions on the welding task, then would determine the relevant quality procedures for a quality management system. Development of such a system is a goal of VB.

Dr. Kunzmann is planning to prepare a questionnaire on the practical application of Computer Assisted Quality in welding and On-Line Monitoring, to see what has been done. Also, we proposed a microseminar for next year in Hungary on the topic "On-Line (Real-Time) Automatic Control of Welding." Assuming that our Commission meetings will be scheduled for the mornings, I will try to arrange this seminar for Thursday afternoon. This has the additional benefit of being a good time for Commission XII to participate. I spoke with Bertil Pekkari, who will try to coordinate our effort with that of Commission XII. Dr. Kunzmann will send me a draft of the scope of the program for my review. We will both try to circulate the final version to as many potential participants as possible.

The intermediate meeting of V-B will be in Basle, Switzerland on Friday, April 19, 1996.

2.3 Subcommission VC – Ultrasonically Based Weld Inspection Topics

The Subcommission VC Chairman, Hermann Wustenberg, gave a short summary from his report of the activities during the past year (IIW Document V-1049-95). The intermediate meeting of the subcommission was held in Fort Lauderdale, Florida on January 12, 1995. He organized his presenta-

tion by the four working groups: Validation of Ultrasonic Weld Inspection Methods, Ultrasonic Inspection of Austenitic Welds, Characterization of Ultrasonic Equipment for Weld Inspection, and Automation and Imaging for the Ultrasonic Inspection of Welds.

The working group on validation of ultrasonic techniques for weld inspection is following the activities of the European Network for Inspection Qualification (ENIQ). This group is primarily concerned with the nuclear industry, and the working groups hopes to broaden their work to cover general inspection.

The working group on ultrasonic inspection of austenitic welds and clad components has held two meetings in the last year. The new handbook on the ultrasonic inspection of clad components is now available. The group is now revising the handbook on inspection of austenitic stainless steel, based on their experiences with the handbook on cladding, and plans to include a chapter in the ultrasonic inspection of dissimilar welds. Mr. Hudgell, the chairman, is retiring and the new chairman will be Gerard Hennaut of Belgium. Mr. Hennaut has developed a list of the major items to include in the next Handbook on the Ultrasonic Examination of Austenitic Welds, including: Inservice Inspection, Instrumentation and Data Displays (but not specific to individual companies), Signal Processing, Dissimilar Welds, The Effect of Welding Procedure, and several other topics.

Discussion about revision to the specification for the IIW ultrasonic calibration block continues. This topic was discussed at the intermediate meeting in Fort Lauderdale, Florida, with input coming from Fred Hotchkiss and Harold Van Valkenburg. This input is being contrasted with input from Europe (IIW Document VC-911-95), with more discussion expected at the next intermediate meeting.

Mr. Chauveau of the Institut de Soudure is the chair of a new working group on "Automation and imaging for the ultrasonic inspection of welds." The primary goal of this working group is to update an old report on automated UT inspection (VC-460-87). The updated document will include descriptions of the recent improvements in digital control and storage capabilities, which greatly strengthen the capabilities of the technique, and provide guidance on the interpretation of the data. The first meeting of this working group is being planned for the second to the last week in November 1995.

The subcommission is continuing its discussions about the validation of NDT techniques for weld inspection. Details on this program are included on the subcommission document VC-907-94/OE. The subcommission expects to begin to prepare an IIW document on this topic in 1995.

We had a short discussion about the difficulties in the inspection of electroslag welds by ultrasound. Some issues include the procedures to develop calibration blocks that accurately represent welds, and whether this technique will give results similar to those of other inspection techniques. Krishna Verma agreed to develop a position paper on the problems for the next intermediate meeting and will mail it to Professor Wustenberg by September.

The Europeans are considering the use of ultrasonic time-of-flight diffraction as a method for detection and sizing of defects. Whether this might be the basis for an ISO standard will be debated in the subcommission.

The future work program of subcommission VC includes:

- revision of the *Handbook on the Examination of Austenitic Welds*,
- revision of the IIW document concerning ultrasonic inspection, especially for the IIW calibration block,
- validation of ultrasonic techniques for weld inspection,
- review of automatic ultrasonic inspection methods, and revision of the manual on this topic,
- inspection of electroslag welds, and
- investigation of spot welds and modeling.

The next meeting of the subcommission will be Tuesday, December 12, 1996 at the Institut de Soudure in Paris.

2.4 Subcommission VE – Weld Inspection Topics Based on Electrical, Magnetic, and Optical Methods

The Subcommittee Chairman, G. Dobmann, presented a review of recent activities (IIW Document V-1050-95).

The subcommittee had one intermediate meeting on January 13, 1995 in Fort Lauderdale, Florida. At this meeting, John Moulder of the Iowa State University expressed interest in eddy current modeling and agreed to prepare an overview paper for the working party that is interested in this topic. We hope that this report will be ready for distribution this fall and can be presented at the 1996 Annual Assembly in Budapest, Hungary.

The working party on characterization of black light lamps is preparing a document "Technical Evaluation of Liquid Penetrants for Hot Surfaces in the Weld Testing Field." Again, we hope to have this report ready soon.

Francesco Peri chairs the working party on characterization of non-metallic welds. He has prepared and circulated a questionnaire on experimental research and standardization activities. The results will be collected into a report on the current state-of-the-art. We expect to have at least a preliminary report by the next meeting.

Anatoly Doubov, a Russian developer of inspection techniques, presented a new inspection technique designed to diagnose the stresses based on the magnetic-elastic and magneto-mechanical phenomena in metals. He has developed a relationship between the residual magnetic field and the residual stress. The main advantages of this new technique are that it does not need special preparation or an external field; rather, it uses only the field which was developed during the welding. The points at which the stress was the maximum during welding are determined by this portable technique. The system can check many kilometers of welds in a short period of time. It can measure the combination of bending and distortion. He showed data on its ability to detect stress corrosion, pitting, and cracking from the outside of a welded tube. The technique can penetrate up to 5 mm of coating or paint. There are over 100 of these systems in operation and they have been used for up to 5 years. They are used by railways, petrochemical manufacturers, and power plants. Dr. Doubov's report, "Strength Diagnostics of Equipment and Designs Based on Metal Magnetic Memory," will be given an S/C VB number and will be circulated within the subcommission this year.

A thematic program, ENRESC (European Network for Residual Stress Characterization), is being prepared. Many European institutes are planning to participate.

The future working program includes:

- activation of the working party on eddy current (sizing of flaws and replacement of magnetic particle examination, low-frequency application for volumetric inspections),
- preparation of a document "Characterization of the Inspection Media for Liquid Penetrant Testing," IIW Recommendations for ISO standardization,
- preparation of a document on the application of liquid penetrant testing in welding, with different annexes that describe the application of this technique for specific industries,
- activation of the working party on non-metallic welds (collection of responses to a questionnaire), and
- harmonization of the European initiatives on residual stress measurements.

2.5 Working Group 2 – Inspection of Offshore Welded Construction

In the absence of the chairman, A. Raine, I presented the annual report of the working group, IIW Doc. V-1051-95. The working group held two intermediate meetings in London, one on December 15, 1994 and one on May 4, 1995.

The emphasis of the working groups has moved away from interest in single-diver subsea inspection, and is moving toward remotely operated vehicles and toward the inspection of topside structural and pressurized components. The interest in remotely operated vehicles is being driven by the need to inspect at greater depths and in more dangerous environments, while the interest in the topside structures is being driven by the difficulty in inspecting for corrosion and cracking through lagging and coatings, and in failures in more complex metallic materials. The working group is evaluating data from reliability trials to determine the optimum inspection frequency.

This year, they have had a number of presentations on offshore NDE including reviews of ICON (Intercalibration of Offshore NDT Equipment) and TIP (Topside Inspection Project). Further details on these programs are included in the annual report.

The working program for the group includes:

- revision of IIW Document V-908-89 "Information on Practices for Underwater Non-Destructive Testing," the major subject of the meeting on May 4,
- review of new problem areas and new techniques, such as:
  - personnel qualification systems for offshore NDT,
  - reliability of offshore NDT techniques/compilation of test trial data,
  - comparison of surface inspection techniques,
  - offshore/underwater electromagnetic techniques and applications,
  - underwater NDT equipment,
  - recent developments in automated and remotely operated NDT systems,
  - downhole inspection,
  - recent developments in local and global structural integrity monitoring techniques for offshore structures, and
  - inspection systems, planning and cost optimization, including probabilistic techniques.

2.6 Miscellaneous Commission V Items

We discussed a response to Commission I on their document on NDT of ceramic-metal assemblies (IIW Doc. I-996-93). We decided to have it translated into English by this fall for detailed consideration by Subcommissions A, C, and E.

We discussed an offer of Dr. Raj, the organizer of the 1996 World Conference on NDE, to have someone make a presentation on the activities of Commission V. A number of very qualified candidates were suggested for making this presentation. After a period of discussion on how to select among these strong candidates, the Commission finally selected Gerd Dobmann, the German Delegate to Commission V and a well-known researcher in this field.

New documents generated at the meeting were:

- V-1055-95 Minutes of the Meeting - June 14, 1995,
- V-1056-95 Reference Radiographs for Assessment of Weld Imperfections According to ISO 5817,
- V-1057-95 Minutes of the Meeting - June 15, 1995, and
- V-1058-95 Minutes of the Meeting - June 16, 1995.

We decided to return to the traditional venue for most of the Commission V intermediate meetings, the Institut de Soudure in Paris. The 1995/96 meetings were scheduled for a date just after the Chairman of Commission's Meeting, which resulted in meeting dates as follows:

-Subcommission VC - December 12, and
-Subcommission VE - December 11.

The other groups will hold their intermediate meetings as follows:

-Subcommission VB - Friday March 17 in Basle, Switzerland, and
-Working Group 2 - one or two times this year, probably in the U.K.

3. Resolutions of the Annual Assembly 1995

3.1 Resolution 1

Commission V recommends that the DVS Reference Radiograph set be adopted as the newest IIW reference radiograph set for use with ISO 5817. The new set will be titled "Reference Radiographs for Assessment of Weld Imperfections According to ISO 5817" and should be identified as IIW Document number V-1056-95, a class B document.

The older sets (both radiographs and a printed book, as listed in the IIW catalog) shall continue to be offered for sale.

3.2 Resolution 2

Subcommission VB proposes to hold a half-day seminar Thursday at the 1996 Annual Assembly on the topic "On-Line (Real-Time) Automatic Control of Welding."

4. Work Program of Commission V

4.1 Subcommission VA – Radiography-Based Weld Inspection Topics

Subcommission VA will concentrate on the following:

- Classification of film systems.
- Completion of standard on radioscopic systems: The Working Party is preparing a three-part standard about the properties and use of radioscopic systems for weld inspection. There will be an experimental phase to experience the practicability of the standard. After finalization of parts 1 and 2, drafting of part 3 remains.
- Revision of ISO standards: Subcommission VA supports ISO TC 44 and TC 135 with text proposals for the revision of weld inspection standards, such as the current review of ISO 5817.
- Assessment of reliability of radiography: New statistical tools (Receiver Operation Characteristic, ROC) will be applied to the question of a quantitative assessment of radiography.
- Evaluation of NDT acceptance criteria in relation to weld quality classes.
- Digitization of film.

4.2 Subcommission VB – Quality Management in Welding Technology

Subcommission VB will concentrate on the following:

- Formulate a concept for quality management in welding (to clarify the relationship between existing standards and to investigate the need for new standards).
- Formulate a guideline for quality management in welding (to help users select a quality-management program adequate for their organization).
- Collect information on computer aided quality control, on-line weld monitoring, fitness-for-purpose, and acceptance criteria in welding (to define the need for further support in applying these tools).

4.3 Subcommission VC – Ultrasonically Based Weld Inspection Topics

Subcommission VC will concentrate on the following:

- Revision of the *Handbook on the Examination of Austenitic Welds*,
- Revision of the IIW documents on ultrasonic inspection, especially for the IIW calibration block,
- Validation of ultrasonic techniques for weld inspection,
- Review of automatic ultrasonic inspection methods, and revision of the manual on this topic,
- Inspection of electroslag welds, and
- Investigation of spot welds and modeling.

4.4 Subcommission VE – Weld Inspection Topics Based on Electrical, Magnetic, and Optical Methods

Subcommission VE has long-term interests in:

- Numerical modeling studies on electric, magnetic, and electromagnetic techniques of NDT for defect detection and sizing in austenitic cladding. The working party in question has agreed upon a near-future research program to compare the software packages that are in use.
- Round-robin action on residual-stress measurement techniques.
- Testing of nonmetallic weldments and preparation of an IIW document on the topic.
- Liquid-penetrant inspection of welds, including the preparation of an IIW document to summarize the state of standardization for characterization of black-light lamps.

For 1994/95 the work has concentrated on the following:

- Activation of the Eddy-Current Working Party. Topics are: surface examination of ferritic welds, including sizing and replacement for magnetic-particle examinations, low-frequency application for volumetric inspections, i.e., of austenitic cladding or aluminum weldments.*
- Preparation of either written recommendations or a handbook on the characterization of black-light equipment.*
- Activation of the Working Party on the inspection of nonmetallic weldments.*
- Reconciliation of European initiatives on residual-stress measurements.*
- Preparation of a document on the application and the procedure of the inspection of hot weldments by using liquid penetrants.
- Preparation of a document on the characterization of the inspection media for the inspection of hot weldments by liquid penetrants.
- Preparation of a document on the relative fluorescence-intensity measurements (low-cost equipment for on-site applications).
- Preparation of a document on the use of the meniscus test for penetrants by image processing.
- Thermography for surface inspection and welding process control.

4.5 Subcommission VF – Weld Defects and Their Significance

No work is planned for 1996/97, apart from necessary follow-up work related to *IIW Guidance on Assessment of the Fitness for Purpose* (SST-1141-89).

4.6 Working Group 2 – Inspection of Offshore Welded Constructions

Working Group 2 will concentrate on the following:

- Revision of "Information on Practices for Underwater Non-Destructive Testing," IIW V-908-89 (IIS/IIW-1033-89).
- Review of special problem areas, new techniques, and applications; collection and organization of information of general interest; report to IIW, if appropriate, in the form of guideline or recommendation proposals. This work shall include, but not be limited to the following topics:
  - reference documents on NDT of offshore constructions
  - personnel qualification schemes for underwater NDT
  - reliability of offshore NDT techniques and compilation of trial results
  - comparative evaluation of surface techniques and the preparation of guidelines
  - examination of offshore, underwater eddy-current tests and the preparation of asummary report
  - fabrication versus in-service NDT of offshore constructions
  - underwater NDT equipment
  - recent developments in automated and remotely operated NDT for offshore use
  - preparation of a survey of ongoing and planned developments and existing equipment
  - downhole inspection
  - pipeline inspection
  - recent developments in local and global structural-integrity monitoring techniques for offshore constructions
  - inspection systematics, planning, cost effectiveness, and optimization, including the use of probabilistic assessment

Appendix A. Organization, Officials, and Delegates

A.1 Organization of IIW Commission V, Quality Control and Quality Assurance of Welded Products

A.1.1 Subcommissions

VA Radiography-Based Weld Inspection Topics
Working Parties
- Classification of Film Systems
- Radioscopic Systems for Weld Inspection
- Validation of Radiographic Techniques for Weld Inspection
- Revision of ISO Standards

VB Quality Management in Welding Technology

VC Ultrasonically Based Weld Inspection Topics
Working Parties
- Ultrasonic Examination of Austenitic Welds
- Validation of Ultrasonic Techniques for Weld Inspection
- Characterization of Ultrasonic Probes for Weld Inspection

VE Weld Inspection Topics Based on Electrical, Magnetic, and Optical Methods
Working Parties
- Stress Measurement Techniques
- Liquid Penetrants and Black-light Lamps
- Eddy-Current Modeling
- Inspection Techniques for Nonmetallic Joints

VF Weld Defects and Their Significance

A.1.2 Working Group

2 Inspection of Offshore Welded Construction

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A.6 Attendance Record – Annual Assembly 1995

Name	Country	Function	14 June	15 June	16 June
Siewert, T.	USA	Commission Chairman/Delegate	×	×	×
Lindewald, C.-G.	Finland	Expert	×	×	
Boussea, M.	France	Observer		×	
Chauveau, D.	France	Expert	×	×	
Rousseau, M.	France	Delegate	×	×	×
Dobmann, G.	Germany	Delegate/Chairman VE			×
Fischer, K.-H.	Germany	Expert	×		
Heidt, H.	Germany	Expert/ Chairman VA	×	×	×
Schmitz, T.	Germany	Observer		×	
Szelagowski, P.	Germany	Expert		×	×
von Hofe, D.	Germany	Expert	×	×	
Wustenberg, H.	Germany	Expert/Chairman VC		×	
Lezzi, F.	Italy	Observer		×	×
Scajio, M.	Italy	Observer		×	×
Van den Berg, R.	The Netherlands	Observer		×	×
Doubov, A.	Russia	Observer			×
Kalna, K.	Slovakia	Observer		×	
Johansson, C.	Sweden	Delegate	×	×	
Sehla, B.	Sweden	Observer	×		
Kunzmann, P.	Switzerland	Delegate/Chairman VB	×	×	×
Garwood, S.	UK	Observer	×		
Verma, K.	United States	Expert	×	×	×

A.6.1 Attendance Statistics

	14 June	15 June	16 June	Any day
Participants:	12	17	11	22
Delegates:	4	4	4	5
Experts:	6	7	3	8
Observers:	2	8	4	9
Countries present:	7	9	7	11

A.7 Subcommission and Working Group Meetings 1995/96

Subcommission VA	13 January 1995	Fort Lauderdale, Florida, USA
Subcommission VB	17 March 1995 March 1996	Basel, Switzerland Basel, Switzerland
Subcommission VC	12 January 1995 12 December 1995	Fort Lauderdale, Florida, USA Paris, France
Subcommission VE	13 January 1995 11 December 1995	Fort Lauderdale, Florida, USA Paris, France
Subcommission VF	No meetings	
Working Group 2	4 May 1995 8 September 1995	London, UK Aberdeen, UK

A.8 Tentative Schedule for Commission V Meetings 1996/97

Tentative dates and places for subcommission and working group meetings in 1996/97 and for the Annual Assembly are

Subcommission VA	January 1997	Paris, France
Subcommission VB	June 1997	Basel, Switzerland
Subcommission VC	January 1997	Paris, France
Subcommission VE	January 1997	Paris, France
Subcommission VF	No meetings	
Working Group 2	1996/1997	UK
Annual Assembly	late July 1997	San Francisco, California, USA

Appendix B. Commission V Documents

B.1 Recent Publishing Action and Position

V-1056-95 Commission V recommends that the DVS Reference Radiograph set be adopted as the newest IIW reference radiograph set for use with ISO 5817. The new set will be titled "Reference radiographs for assessment of weld imperfections according to ISO 5817" and should be identified as an IIW class B document.

B.1.1 Handbooks and Booklets

V-847-87 *Non-destructive Measurement and Analysis of Residual Stress in Welds (IIS/IIW-936-87)*
Published as Bulletin 383 by the Welding Research Council, New York in July 1993.

SST-1141-89 *Assessment of the Fitness-for-Purpose of Welded Structures*
Published by the Danish Welding Society in English in May 1991.
French version in preparation.

V-939-90 *Handbook on the Ultrasonic Examination of Austenitic Clad Materials* (IIS/IIW-1080-90)
Published by the CEC Joint Research Establishment, Ispra, Italy, 1994.

B.1.2 *Welding in the World* Articles

V-1034-94 "The Status of NDT Technology used for Welded Structures in China," Shengtian Li and Zhihua Liu, *Welding in the World*, 35, no. 4, 1995.

V-1035-94 "Characterization of Black Light Equipment: Critical Factors and Supporting Data," *Welding in the World*, 36, no. 3, 1996.

V-1044-94 "Welding Technology Margin and its Application in Welding Quality Assurance," Zhihua Liu, Keqin Li, and Haojun Jiao, *Welding in the World*, 35, no. 6, 1995.

B.2 Commission V Documents 1994/95

Number	Title/Document Description
V-1041-94	Minutes of the Annual Assembly Meeting - 7 September 1994
V-1042-94	*The Use of Fitness for Purpose (FFP) of Welded Structures in Sweden*, Lars Dahlberg, a document already circulated within Subcommission VB
V-1043-94	Minutes of the Annual Assembly Meeting - 8 September 1994
V-1044-94	*Welding Technology Margin and its Application in Welding Quality Assurance*, Liu Zhihuan, a revised form of the document presented in Beijing, this version forwarded to *Welding in the World.*
V-1045-94	Minutes of the Annual Assembly Meeting - 9 September 1994
V-1046-95	Commission V Annual Report - 1994/95
V-1047-95	Subcommission VA Annual Report
V-1048-95	Subcommission VB Annual Report
V-1049-95	Subcommission VC Annual Report
V-1050-95	Subcommission VE Annual Report
V-1051-95	Working Group 2 Annual Report
V-1052-95	Report of a January 1995 workshop between IIW Commission and ASTM Committee E07 (NDE)
V-1053-95	Agenda for 1995 Annual Assembly - Stockholm
V-1054-95	Commission V Documents - 1994/95

B.3 Documents Recommended for Publication

Commission V recommends that the DVS Reference Radiograph set be adopted as the newest IIW reference radiograph set for use with ISO 5817. The new set will be titled "Reference Radiographs for Assessment of Weld Imperfections According to ISO 5817" and should be identified as IIW Document number V-1056-95, a class B document.

The older sets (both radiographs and a printed book, as listed in the IIW catalog) shall continue to be offered for sale.

B.4 Sales of Commission V Documents

	1993	1992	1991	1990	1989
Collection of Reference Radiographs of Butt Welds in Steel	67	111	74	89	93
Collection of Reference Radiographs of Butt Welds in Aluminum and Aluminum Alloys	22	21	16	18	28
Reference Radiographs (Blue Booklet)					
English/French	274	3252	56	204	219
English/French/3rd language	30	310	134	236	
Handbook on Radiographic Apparatus Techniques					
English	24	47	60	29	27
French	123	54	166	137	114
Swedish	10	5	5	10	
List of Terms Used in the Ultrasonic Examination of Welds	2	3	3	30	6
Handbook on Ultrasonic Examination of Welds					
English	38	39	75	60	133
French	33	8	83	130	64
Dutch	0	0	15	29	29
Finnish					15
Handbook on the Ultrasonic Testing of Austenitic Welds					
English	43	26	26	32	32
French	3	3	4	4	9
German	31	7	31	30	35
Evaluation of Ultrasonic Signals	10	35	55	84	94
Handbook on the Magnetic Examination of Welds	29	45	23	131	15
Automated Ultrasonic Weld Inspection	*	*	*	*	*
Guidelines for Quality Assurance in Welding Technology	64	44	173	157	*
IIW Guidance on Assessment of the Fitness for Purpose (SST-1141-89)					
English	61	43	169		
Non-destructive Measurement and Analysis of Residual Stress in and around Welds — A State of the Art Survey (V-847-87)	330				
Total items sold	953	4053	1168	1410	902

* information not available